Report Title

"Basin Analysis and Petroleum System Characterization and Modeling, Interior Salt Basins, Central and Eastern Gulf of Mexico"

Type of Report

Third Quarterly Progress Report for Year 2

Reporting Period Start Date

November 1, 2004

Reporting Period End Date

January 31, 2005

Principal Author

Ernest A. Mancini (205/348-4319)
Department of Geological Sciences
Box 870338
202 Bevill Building
University of Alabama
Tuscaloosa, AL 35487-0338

Date Report was Issued

February 1, 2005

DOE Award Number

DE-FC26-03NT15395

Name and Address of Participants

Ernest A. Mancini
Dept. of Geological Sciences
Box 870338
Tuscaloosa, AL 35487-0338

Donald A. Goddard
Center for Energy Studies
Louisiana State University
Baton Rouge, LA 70803

Disclaimer

Abstract

The principal research effort for Year 2 of the project is the determination of the burial and thermal maturation histories and basin modeling and petroleum system identification of the North Louisiana Salt Basin. In the first six (6) to nine (9) months of Year 2, the research focus is on the determination of the burial and thermal maturation histories and the remainder of the year the emphasis is on basin modeling and petroleum system identification. No major problems have been encountered to date, and the project is on schedule.

TABLE OF CONTENTS

"Basin Analysis and Petroleum System Characterization and Modeling, Interior Salt Basins, Central and Eastern Gulf of Mexico"

Third Quarter Report for Year 2
November 1, 2004—January 31, 2005

Introduction

The University of Alabama and Louisiana State University have undertaken a cooperative 5-year, fundamental research project involving sedimentary basin analysis and petroleum system characterization and modeling of the North Louisiana Salt Basin and Mississippi Interior Salt Basin. According to the USGS, the hydrocarbon volume of these basins ranks them in the top 8% of the most petroliferous basins of the world.

Executive Summary

The principal research effort for Year 2 of the project is the determination of the burial and thermal maturation histories and basin modeling and petroleum system identification of the North Louisiana Salt Basin. In the first six (6) to nine (9) months of Year 2, the research focus is on the determination of the burial and thermal maturation histories and the remainder of the year the emphasis is on basin modeling and petroleum system identification. No major problems have been encountered to date, and the project is on schedule.

Project Objectives

The principal objectives of the project are to develop through basin analysis and modeling the concept that petroleum systems acting in a basin can be identified through basin modeling and to demonstrate that the information and analysis resulting from characterizing and modeling of these petroleum systems in the North Louisiana Salt Basin and the Mississippi Interior Salt Basin can be used in providing a more reliable and advanced approach for targeting stratigraphic traps and specific reservoir facies within a geologic system and in providing a refined assessment of undiscovered and underdeveloped reservoirs and associated oil and gas resources.

Experimental

Work Accomplished (Table 1)

Thermal History—The construction of the thermal maturation history profiles for the wells included in the cross sections (Figures 1-3) for the North Louisiana Salt Basin have been prepared. Examples of these profiles (Figures 4-12) are included in this report. Interpretation of the thermal maturation history profiles has been completed and is illustrated in thermal maturity cross sections (Figure 13).

Work Planned

Hydrocarbon migration pathway modeling for the North Louisiana Salt Basin will begin, and the process of identifying the petroleum systems in this basin will be initiated.

Results and Discussion

No major problems have been encountered at this point. We are working with companies operating in the basin to acquire selective seismic profiles in this study.

Conclusions

The project work is on schedule.

References

Evans, R., 1987, Pathways of migration of oil and gas in the South Mississippi salt basin: GCAGS Transactions, v. 37, p. 75-86.

Mancini, E.A., Parcell, W.C., and Puckett, T.M., 1999, Modeling of the burial and thermal histories of strata in the Mississippi Interior Salt Basin: GCAGS Transactions, v. 49, p. 332-341.

Mancini, E.A., Parcell, W.C., Puckett, T.M., and Llinas, J.C., 2001, Topical Report 4, Basin and petroleum migration modeling of the Mississippi Interior Salt Basin, DOE Report, 46 p.

Mancini, E.A., and Puckett, T.M., 2002, Transgressive-regressive cycles: application to petroleum exploration for hydrocarbons associated with Cretaceous shelf carbonates and coastal and fluvial-deltaic siliciclastics, northeastern Gulf of Mexico, Sequence Stratigraphic Models for Exploration and Production: GCS-SEPM Foundation, p. 173-199.

Mancini, E.A., Puckett, T.M., Parcell, W.C., Llinas, J.C., Kopaska-Merkel, D.C., and Townsend, R.N., 2002, Basin analysis of the Mississippi Interior Salt Basin and petroleum system modeling of the Jurassic Smackover Formation, eastern Gulf Coastal Plain, DOE Report, DE-FG22-96BC14946, 487 p.

Nunn, J.A., 1984, Subsidence histories for the Jurassic sediments of the northern Gulf Coast: thermal-mechanical model, Jurassic of the Gulf Rim: GCS-SEPM Foundation, p. 309-322.

Pilger, R.H., 1981, The opening of the Gulf of Mexico: implications for the tectonic evolution of the northern Gulf Coast: GCAGS Transactions, v. 31, p. 377-381.

Puckett, T.M., Bearden, B.L., Mancini, E.A., and Panetta, B.J., 2000, Topical Report 3, Petroleum plays and underdeveloped reservoirs in the Mississippi Interior Salt Basin, DOE Report, 105 p.

Waples, D.W., 1994, Modeling of sedimentary basins and petroleum systems, Petroleum System—from Source to Trap: AAPG Memoir 60, p. 307-322.

Zimmerman, R.K., 1998, Chronology of oil generation in Louisiana's fractured Austin Chalk deep horizontal drilling trend: GCAGS Transactions, v. 48, p. 517-525.

Zimmerman, R.K., 1999, Potential oil generation capacity of the north Louisiana hydrocarbon system: GCAGS Transactions, v. 49, p. 532-540.

Zimmerman, R.K., and Sassen, R., 1993, Hydrocarbon transfer pathways from Smackover source rocks to younger reservoir traps in the Monroe Gas Field, Northeast Louisiana: GCAGS Transactions, v. 43, p. 473-480.

Zimmerman, R.K., and Shi, Y., 1996, Simulation and modeling of the hydrocarbon generation migration-mixing processes in Louisiana sedimentary basins: GCAGS Transactions, v. 46, p. 485.

Table 1
Milestone Chart—Year 2

	M	J	J	A	S	O	N	D	J	F	M	A
Burial History	▒▒▒▒▒▒▒▒ xxxxxxxxxxxxxxxxxxxx											
Thermal History					▒▒▒▒▒▒▒▒ xxxxxxxxxxxxxxxxxxxx							
Basin Modeling & Petroleum System Identification										▒▒▒▒▒▒▒▒		

Work Planned ▒▒
Work Accomplished xx

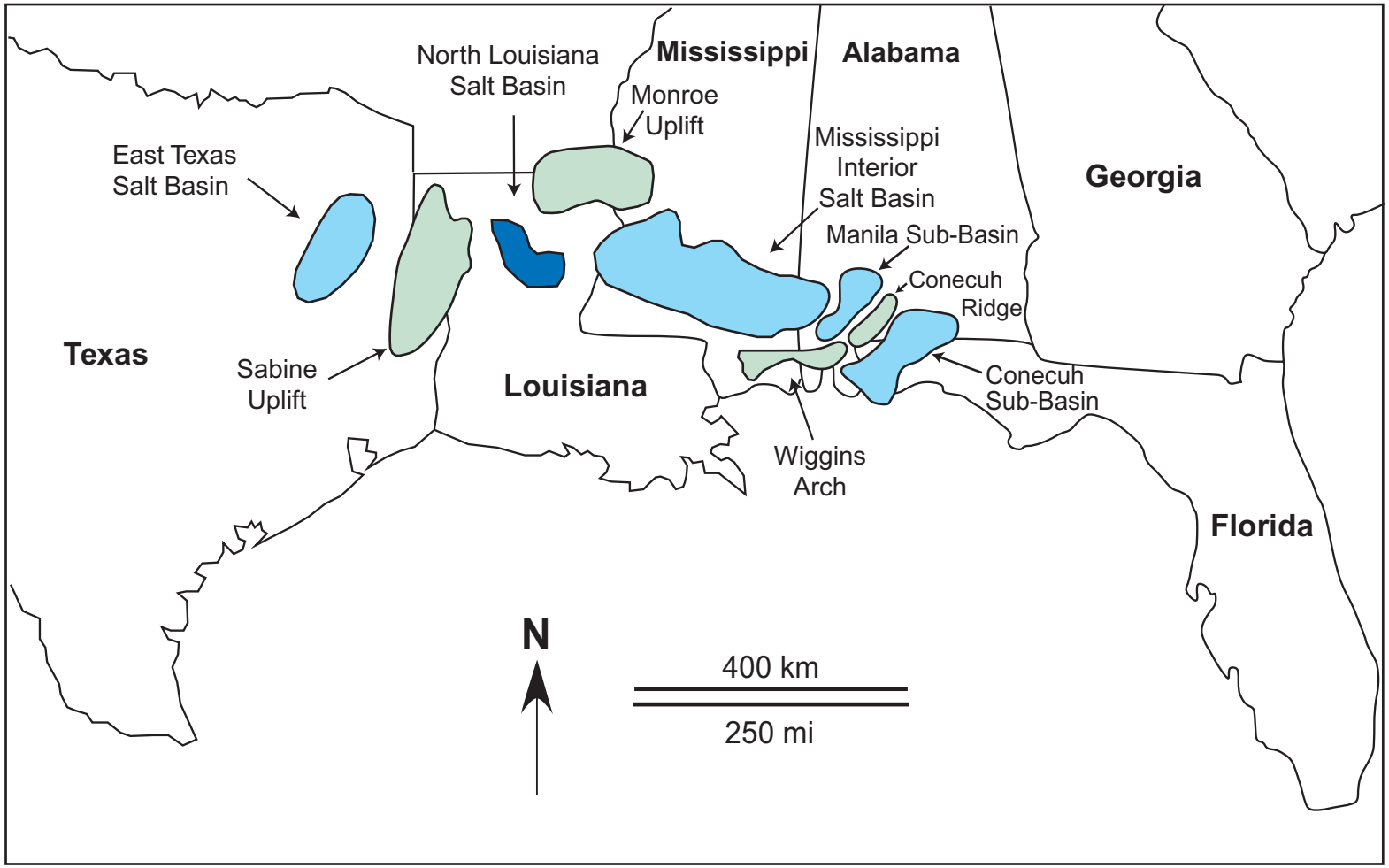

Figure 1. Map illustrating location of basins and sub-basins.

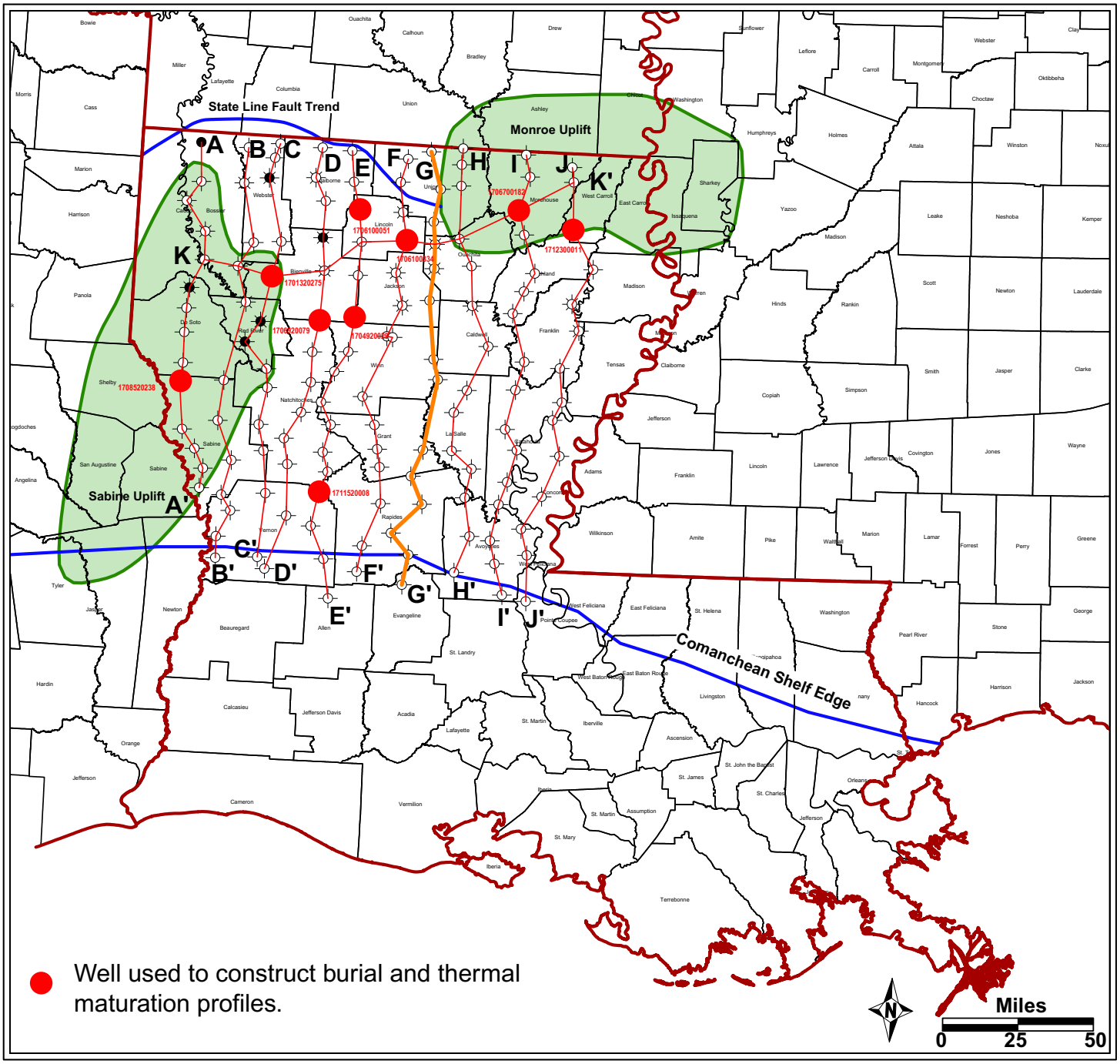

Figure 2. Index map showing line of cross sections and location of wells for the North Louisiana Salt Basin.

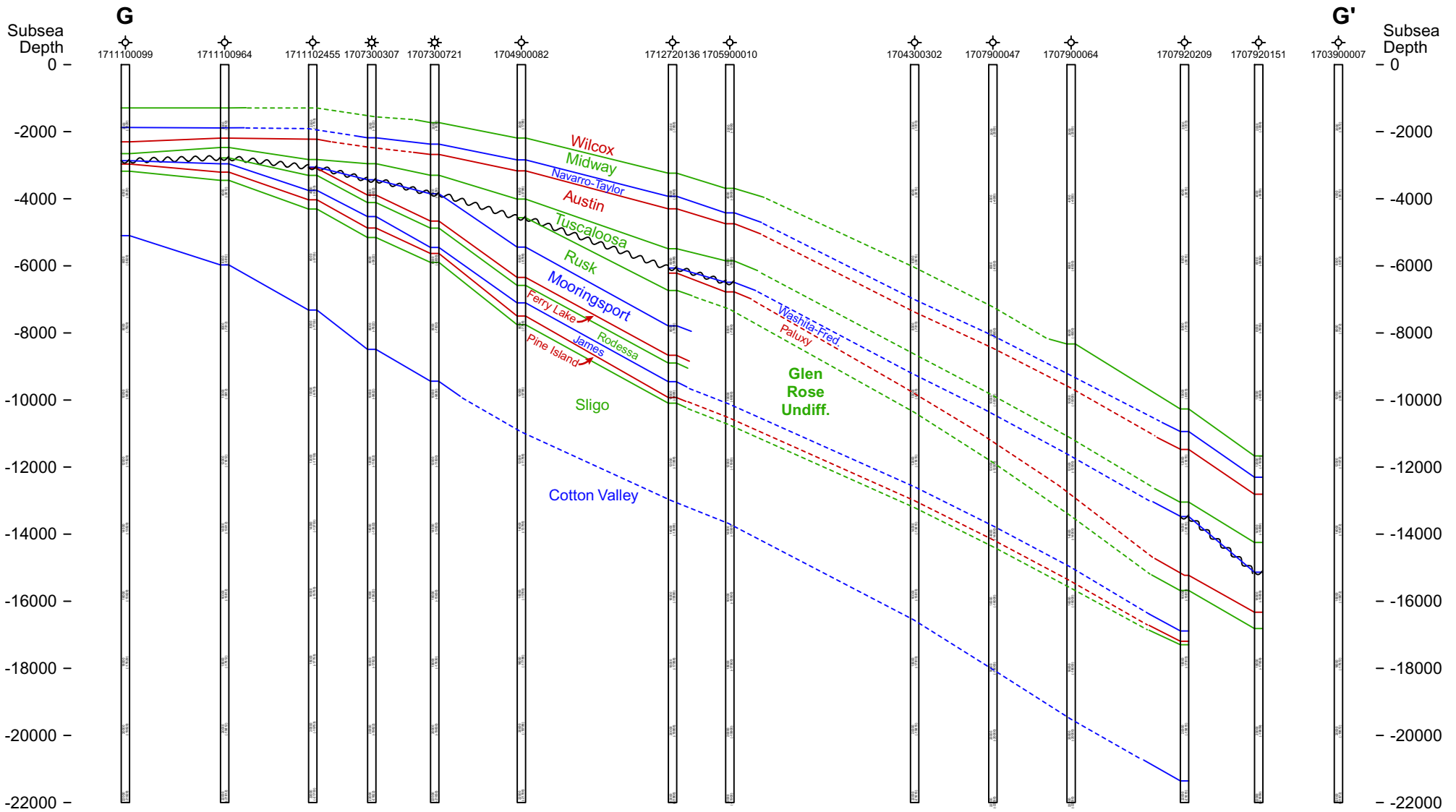

Figure 3. Cross section G-G' for the North Louisiana Salt Basin. See Figure 2 for location of cross section.

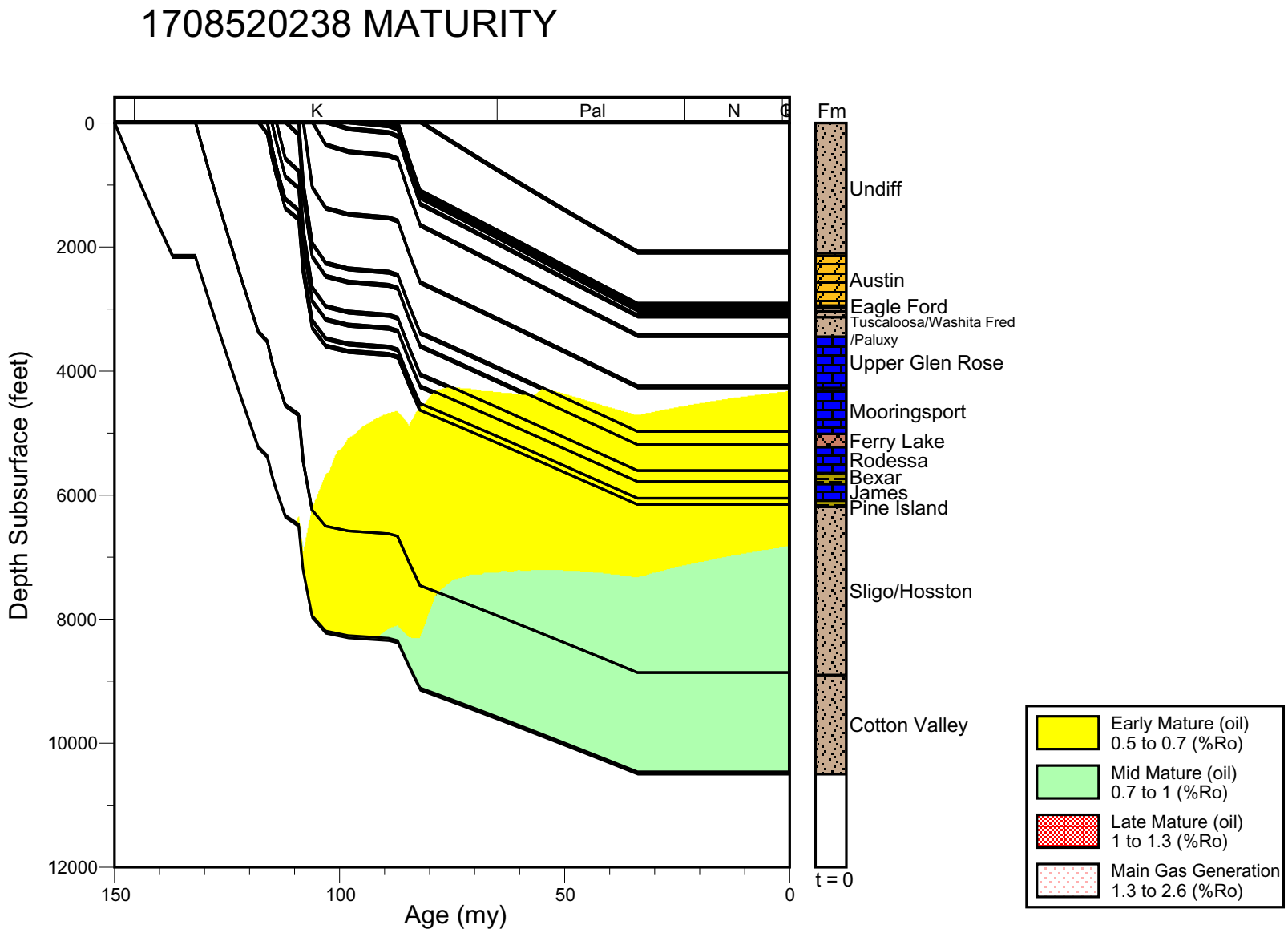

Figure 4. Thermal maturation profile for well 1708520238, North Louisiana Salt Basin. See Figure 2 for well location.

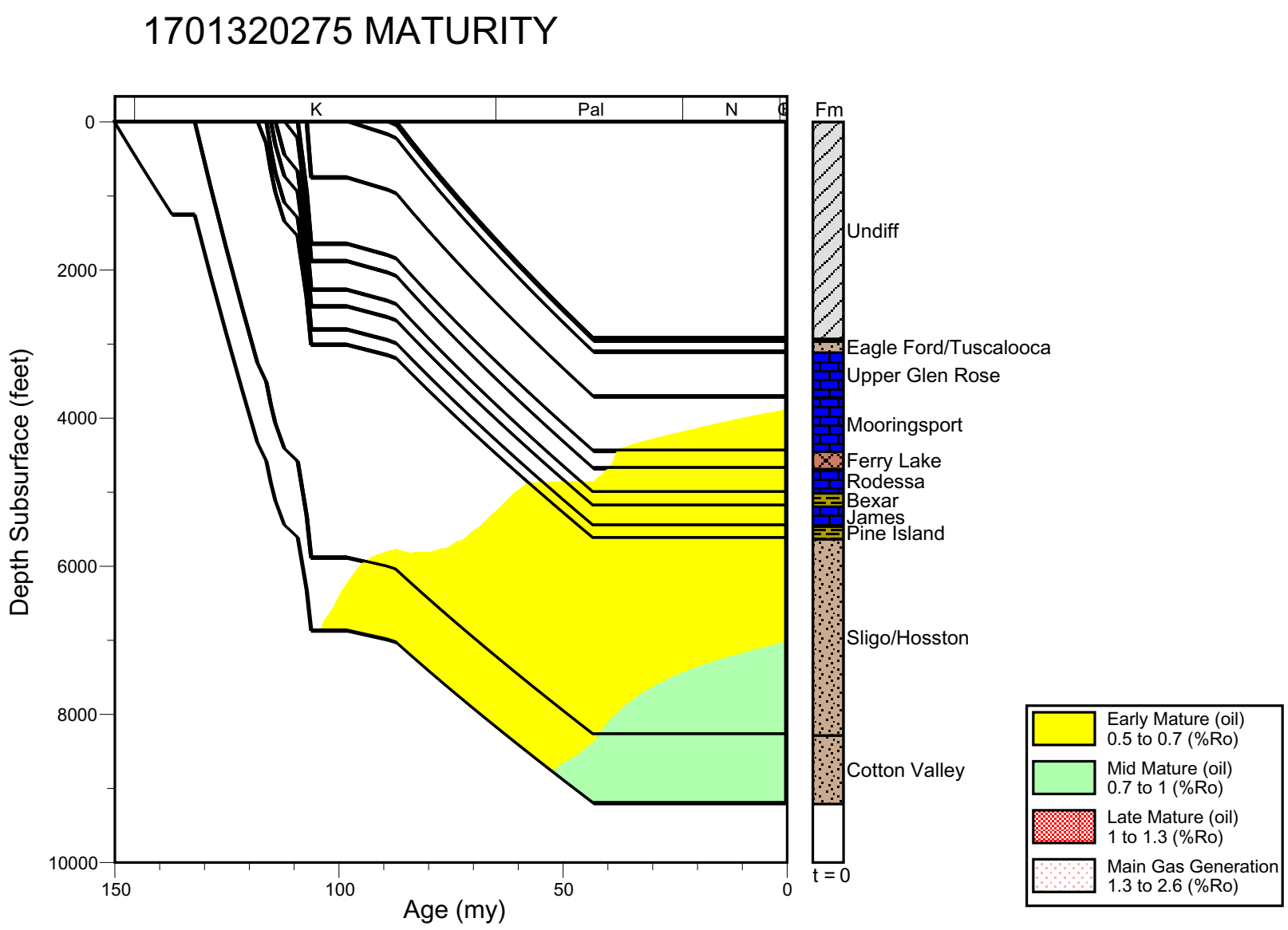

Figure 5. Thermal maturation profile for well 1701320275, North Louisiana Salt Basin. See Figure 2 for well location.

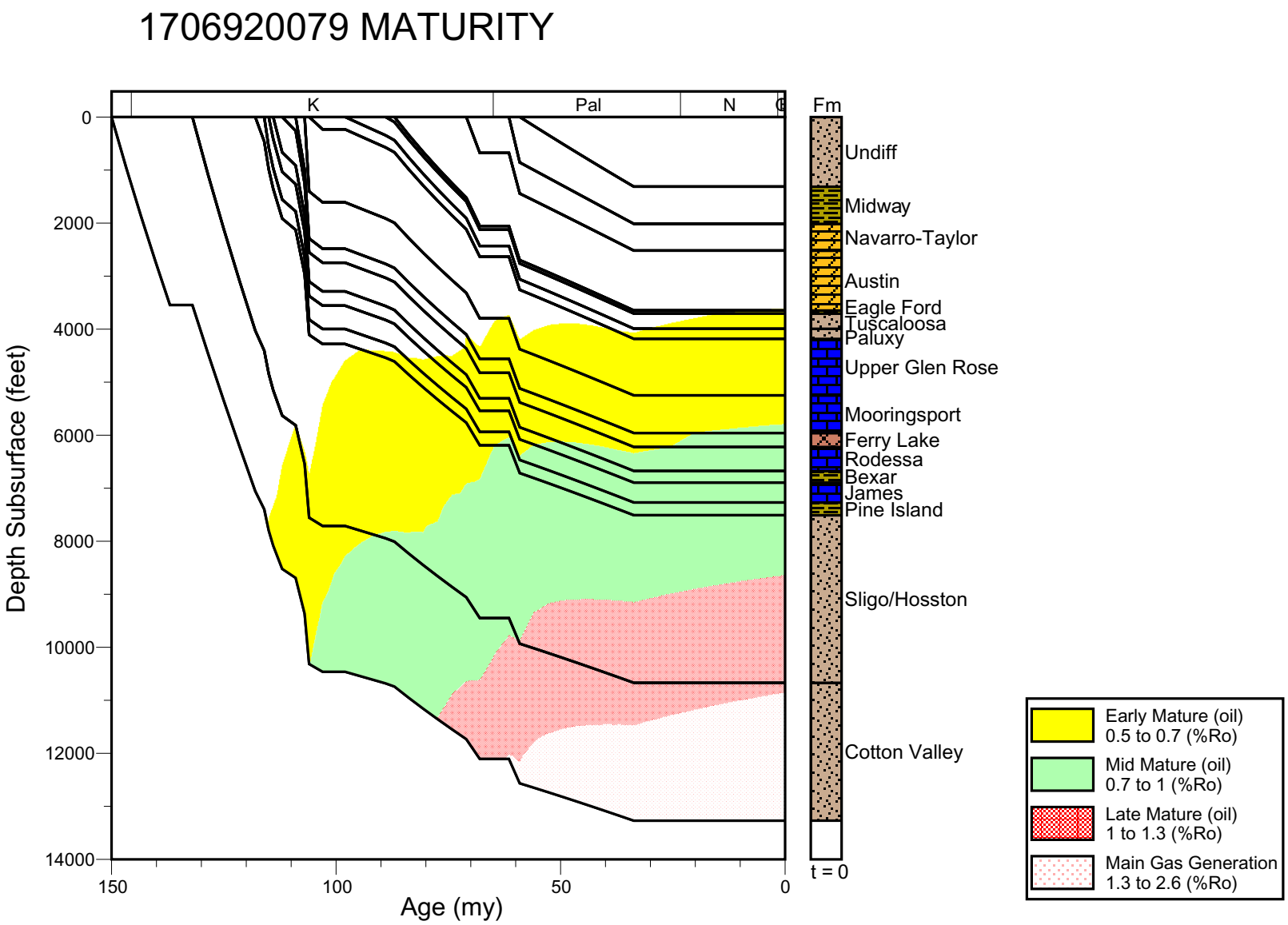

Figure 6. Thermal maturation profile for well 1706920079, North Louisiana Salt Basin. See Figure 2 for well location.

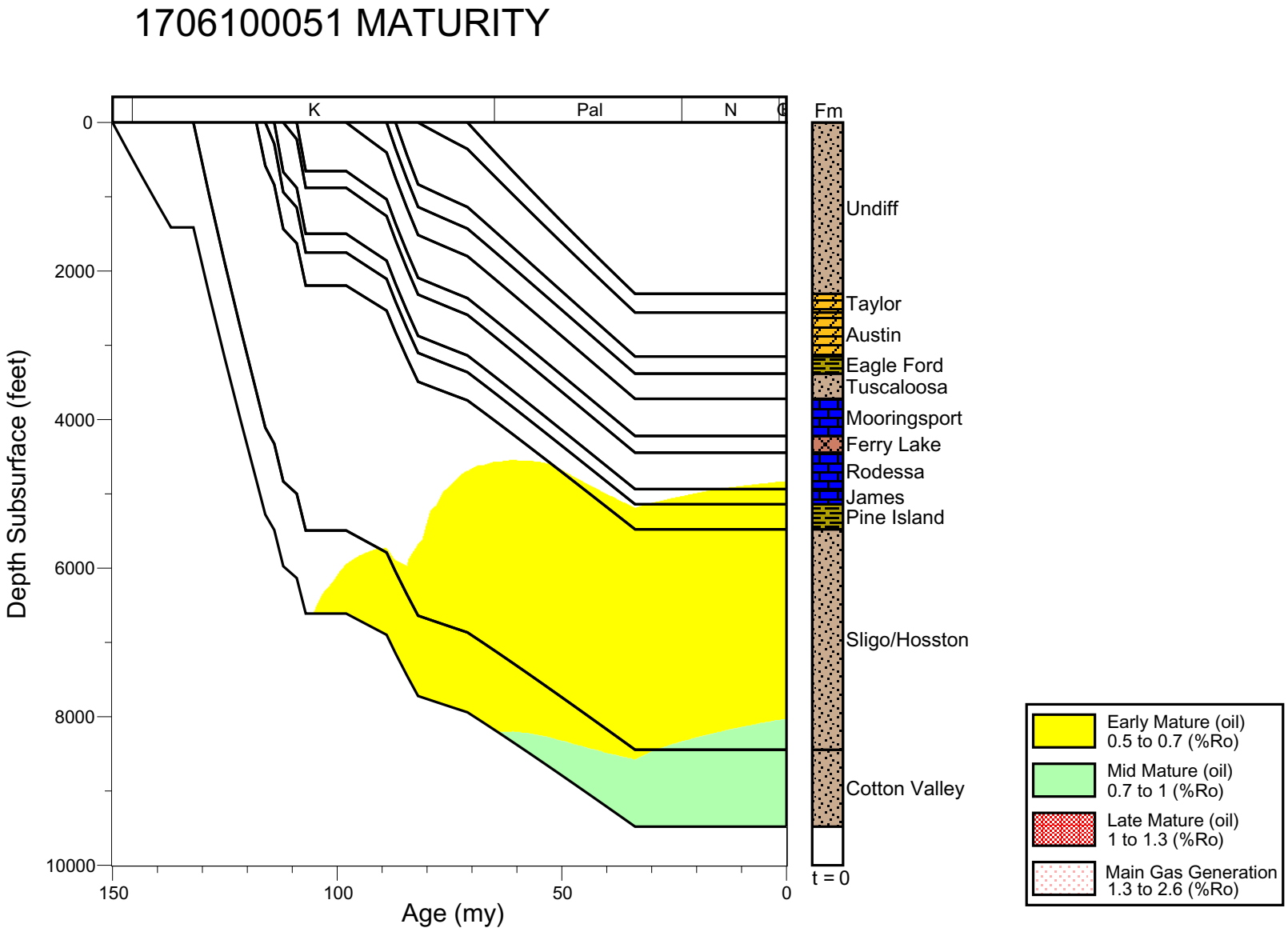

Figure 7. Thermal maturation profile for well 1706100051, North Louisiana Salt Basin. See Figure 2 for well location.

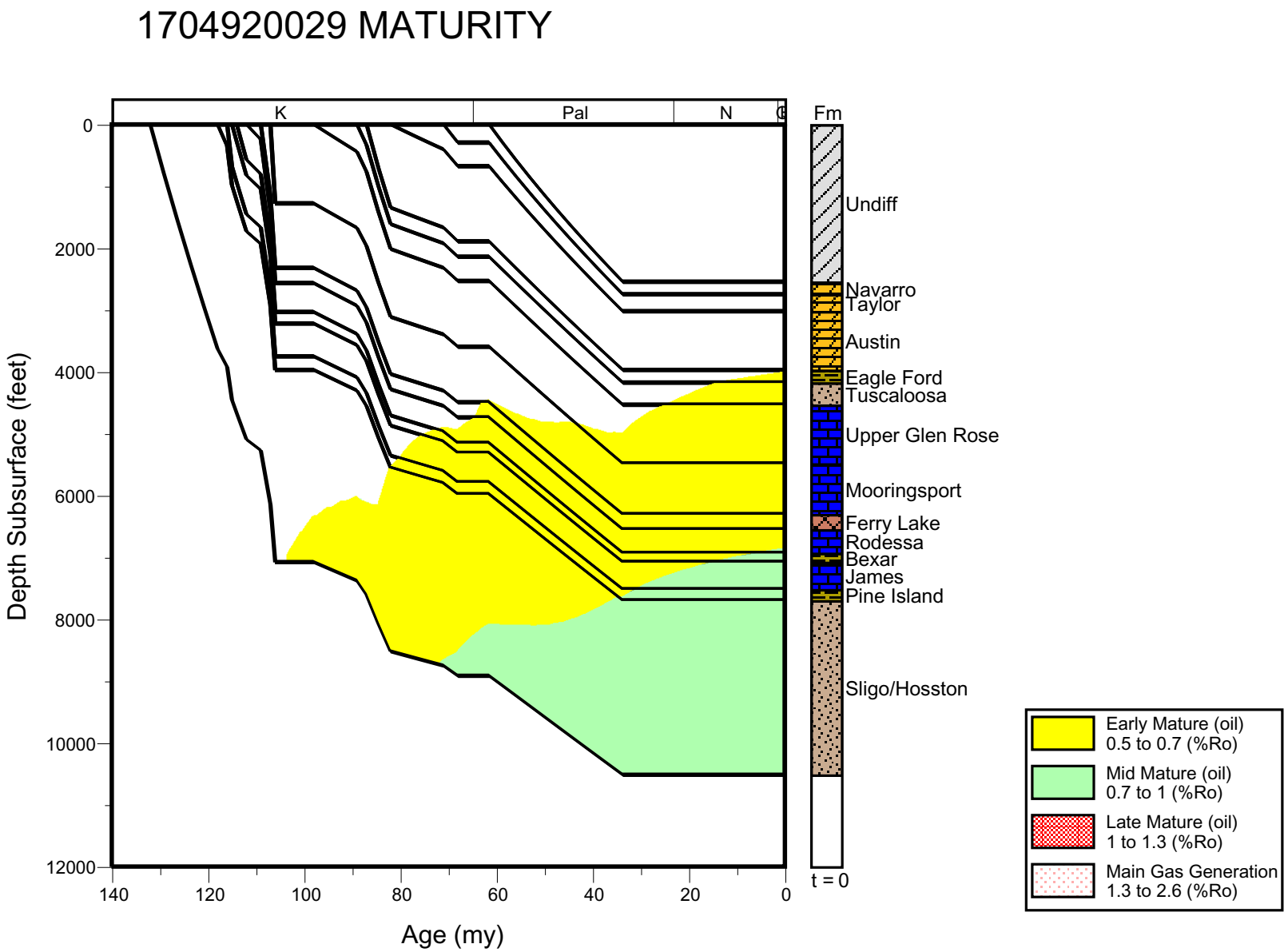

Figure 8. Thermal maturation profile for well 1704920029, North Louisiana Salt Basin. See Figure 2 for well location.

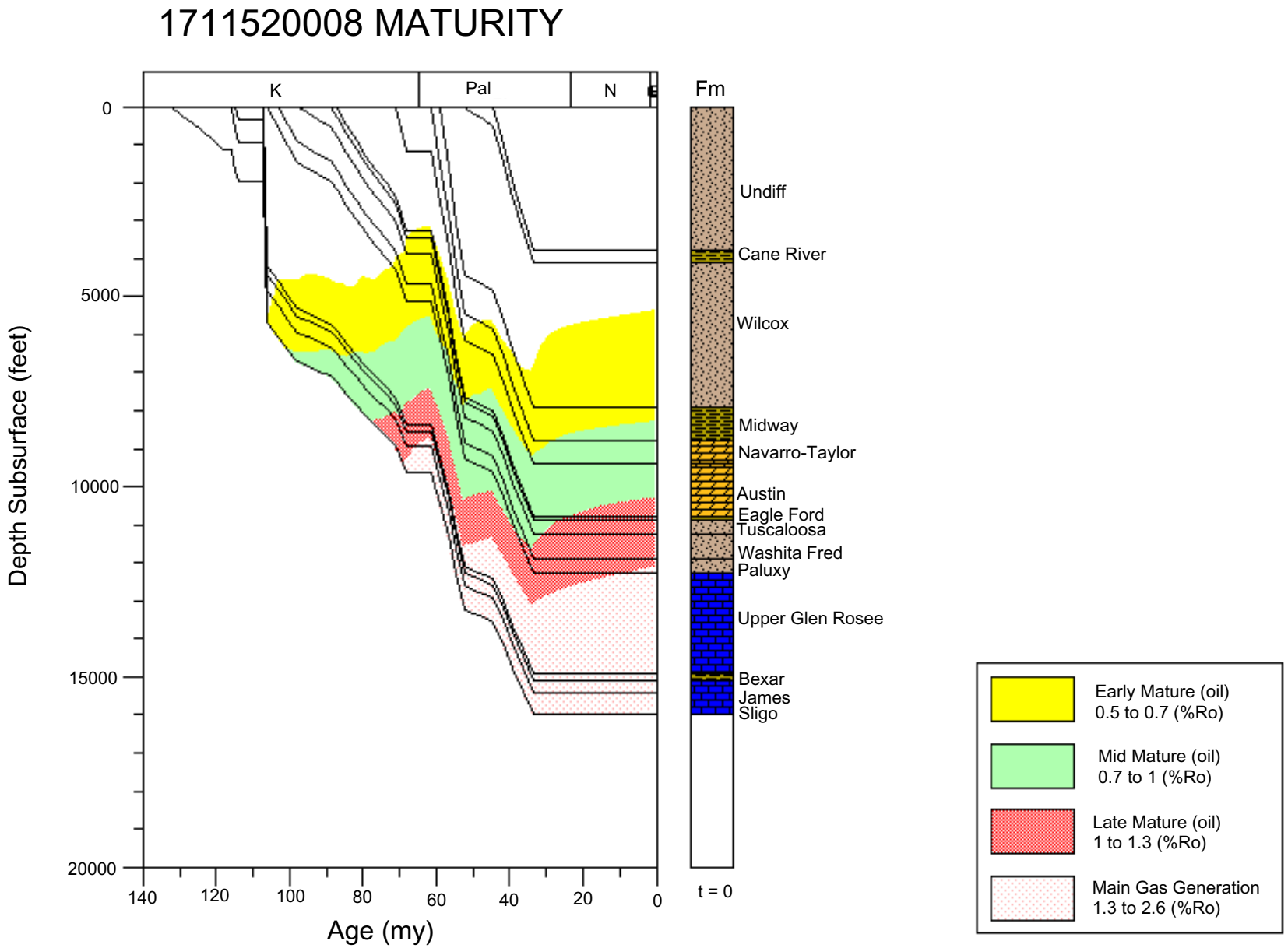

Figure 9. Thermal maturation profile for well 1711520008, North Louisiana Salt Basin. See Figure 2 for well location.

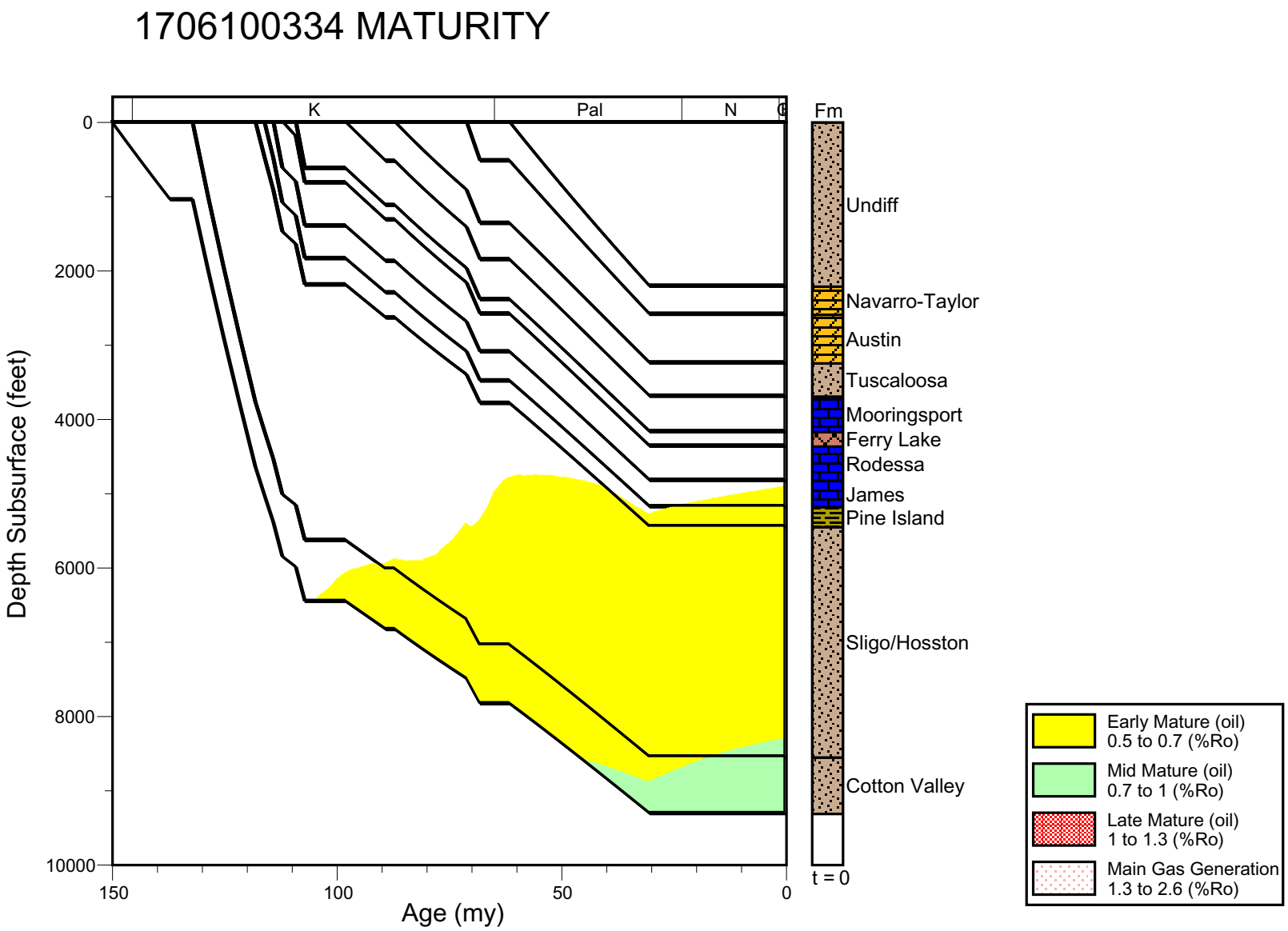

Figure 10. Thermal maturation profile for well 1706100334, North Louisiana Salt Basin. See Figure 2 for well location.

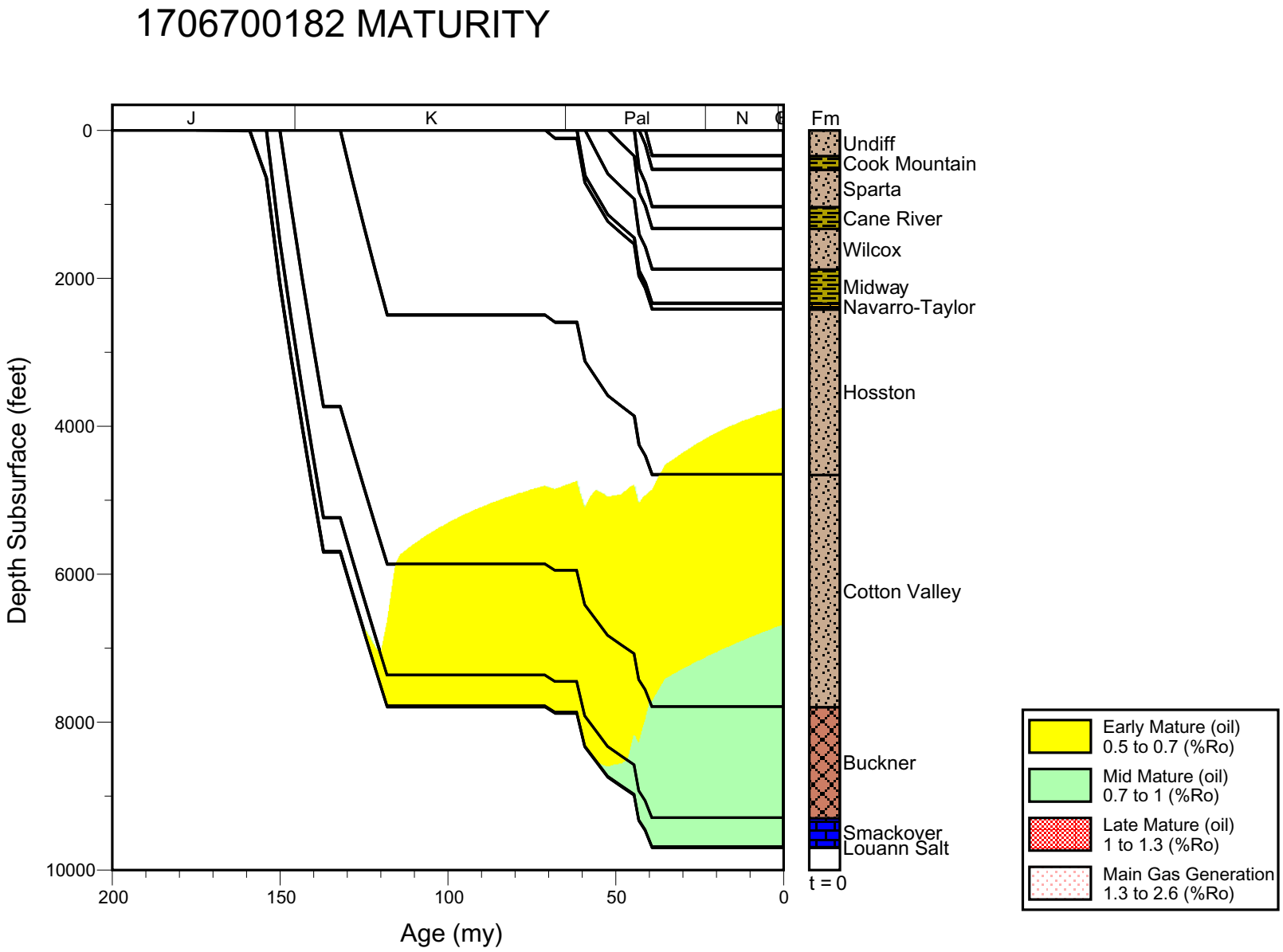

Figure 11. Thermal maturation profile for well 1706700182, North Louisiana Salt Basin. See Figure 2 for well location.

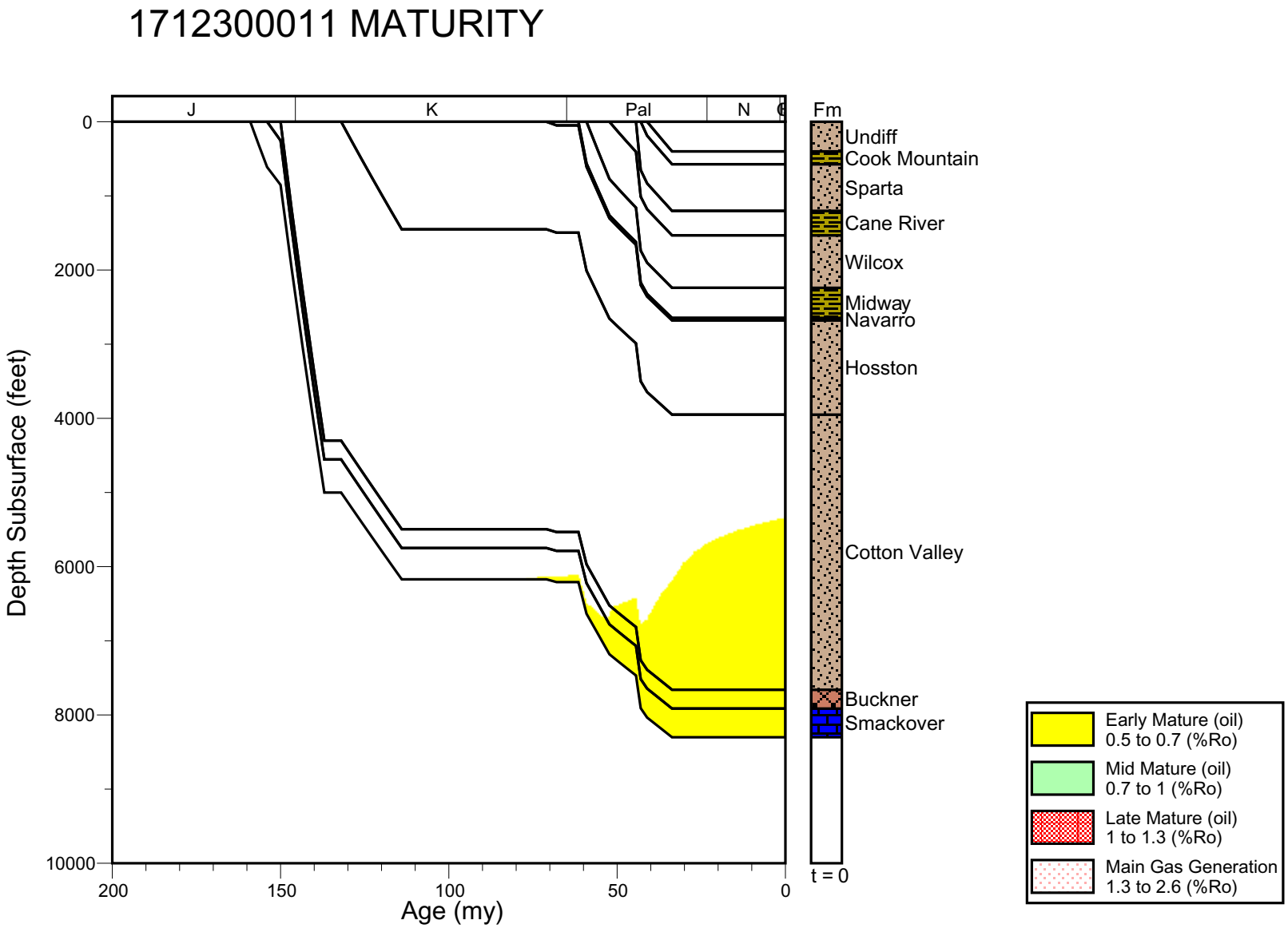

Figure 12. Thermal maturation profile for well 1712300011, North Louisiana Salt Basin. See Figure 2 for well location.

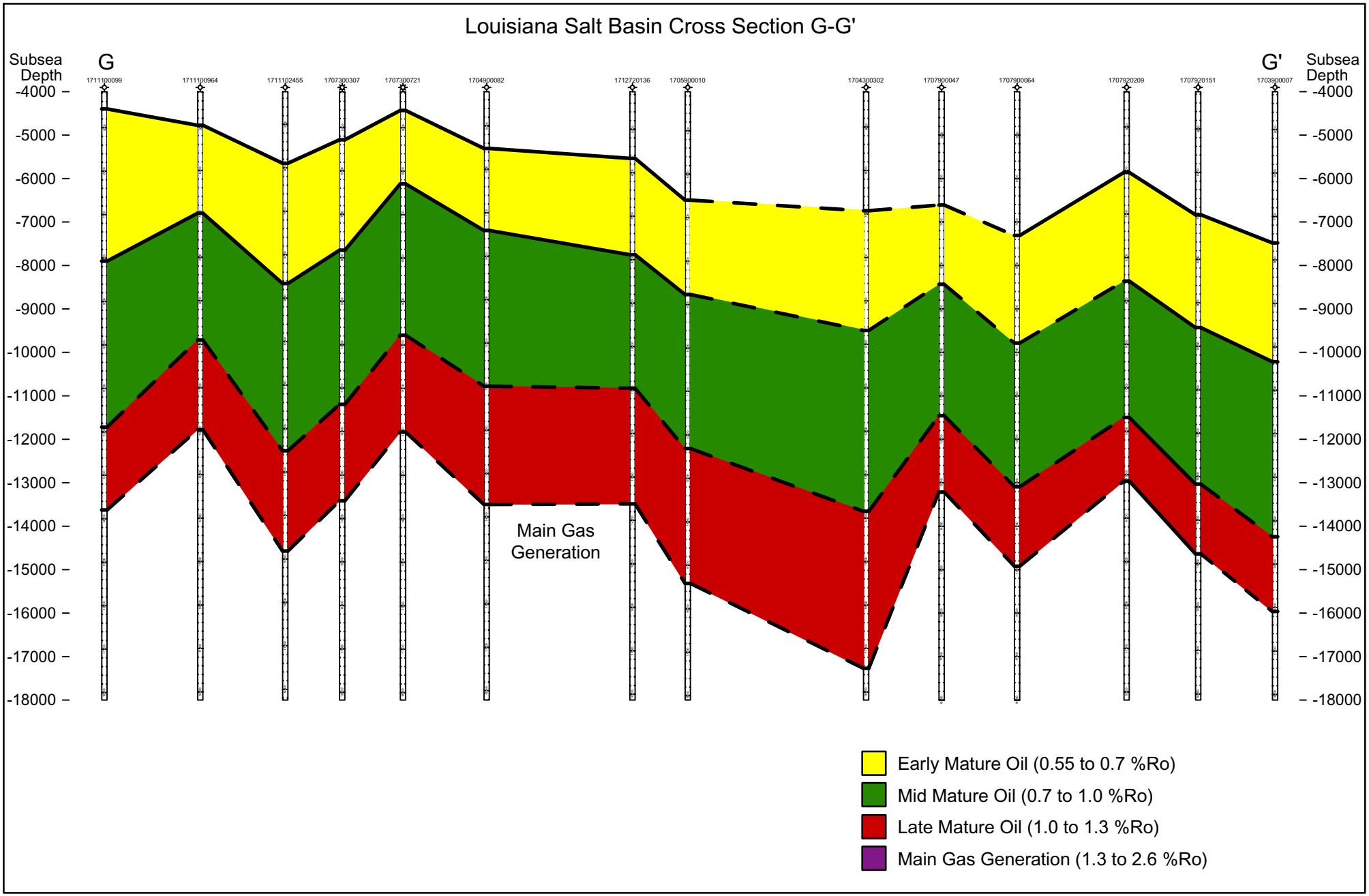

Fig. 13 Regional maturity profile G-G'.